

Scramjet Combustion Stability Behavior Modeling, Phase I

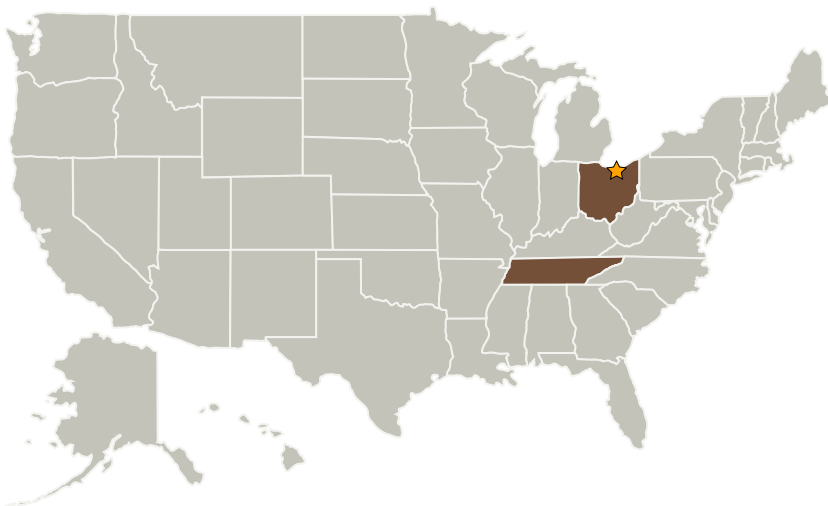
Completed Technology Project (2009 - 2009)



Project Introduction

A recent breakthrough in combustion stability analysis (UCDS) offers the means to accurately predict the combustion stability of a scramjet. This capability is very important due to the extreme scramjet operational environment, which makes cut-and-try development approaches impractical. With UCDS, it is now possible to accurately predict the scramjet pressure oscillation amplitudes, along with critical parameters, including the unsteady wall heat flux. The UCDS tools were recently applied to the Ares I thrust oscillation issue in support of NASA's Thrust Oscillation Focus Team (TOFT). This effort included the analysis of the Shuttle four segment solid rocket motor (RSRM) to validate the capabilities of UCDS. After analyzing the new five segment (RSRMV) motor being developed for Ares I, GTL used the UCDS insight to identify a relatively minor motor modification that will eliminate the organized motor oscillations. With this validation of the capabilities and effectiveness of UCDS, GTL proposes to extend the application of UCDS by applying it to examine the stability characteristics of a representative scramjet. In addition to predicting the amplitudes of the scramjet pressure oscillations, a UCDS sensitivity analysis will be used to identify critical design parameters and establish development guidelines.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Glenn Research Center (GRC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★ Glenn Research Center(GRC)	Lead Organization	NASA Center	Cleveland, Ohio
Gloyer-Taylor Laboratories LLC	Supporting Organization	Industry	Tullahoma, Tennessee

Primary U.S. Work Locations	
Ohio	Tennessee

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.2 Thermal Control Components and Systems
 - └ TX14.2.5 Thermal Control Analysis